

1                   **A SPIN-VALVE SENSOR WITH PINNING LAYERS COMPRISING**  
2                   **MULTIPLE ANTIFERROMAGNETIC FILMS**

3                   **ABSTRACT OF THE INVENTION**

4                   A spin-valve sensor with pinning layers comprising multiple antiferromagnetic films  
5                   is disclosed. The multiple antiferromagnetic films are preferably selected from the same Mn-  
6                   based (Ni-Mn or Pt-Mn) alloy system. The Mn content of the antiferromagnetic film in  
7                   contact with the reference layer of the spin-valve sensor is selected in order to maximize its  
8                   exchange coupling to the reference layer, thereby providing a high unidirectional anisotropy  
9                   field for proper sensor operation. The Mn content of the other antiferromagnetic films not  
10                  in contact with the reference layer of the spin-valve sensor is reduced in order to maximize  
11                  the thermal stability and corrosion resistance of the spin-valve sensor for robust sensor  
12                  operation at high temperatures in disk drive environments.

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